

PATENTREMARKS

Claims 1-18 are currently pending and are subject to a restriction requirement. In the Office Action, claims 10-18 were grouped into a first invention group I said to be drawn to a regulator having a current mirror (class 323, subclass 315) and claims 1-9 were grouped into a second invention group II said to be drawn to a transconductance amplifier (class 330, subclass 297), where the first and second invention groups were alleged to be distinct.

Applicant respectfully traverses the restriction requirement and provisionally elects claims 1-9 of invention group II.

As stated in MPEP 806.01, for a restriction requirement to be proper, "it is the *claimed* subject matter that is considered and such *claimed* subject matter must be compared in order to determine the question of distinctness or independence" (emphasis added). And MPEP 806.02 states that "[f]or the purpose of a decision on the question of restriction, and for this purpose only, the claims are ordinarily *assumed to be in proper form and patentable* (novel and unobvious) over the prior art" (emphasis added).

In the present case, the test for restriction as stated in the Office Action is MPEP 806.05(c), which states that "[i]n order to establish that combination and subcombination inventions are distinct, two-way distinctness must be demonstrated. The inventions are distinct if it can be shown that a combination as claimed: (A) does not require the particulars of the sub-combination as claimed for patentability (to show novelty and unobviousness), and (B) the subcombination can be shown to have utility either by itself or in other and different relations. When these factors cannot be shown, such inventions are not distinct."

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In the Office Action, it was stated that the basis for the restriction was that “the combination as claimed does not require the particulars of the subcombination as claimed because the claimed combination *does not recite the particulars of the subcombination*” (emphasis added), which is the (A) portion of the test stated in the MPEP.

Claims 1-9 are directed towards a transconductance amplifier including a plurality of transistors, a bias current device, a plurality of current mirrors, and a plurality of current sources. In claim 1, each transistor has first and second current terminals and a current control terminal receiving a corresponding one of a plurality of sense voltages, where each sense voltage is indicative of output inductor current of a corresponding phase of the multi-phase regulator. Claims 10-13 are directed towards an N-phase regulator including N output circuits, N output current sensing circuits, a transconductance amplifier, and a power circuit. The N-phase regulator of claim 10 includes N transistors, a bias current device, N current mirrors, and N current sources. In this case, each of the N transistors has first and second current terminals and a control terminal receiving a corresponding one of said N sense voltages from the N output current sensing circuits. In review of these sets of claims, it appears that the transconductance amplifier of claims 1-9 would be the *sub-combination* and that the N-phase regulator of claims 10-13 would be the *combination* since including the sub-combination, namely, a transconductance amplifier.

It is first noted that the Examiner’s stated reasoning for asserting the combination/sub-combination restriction, namely that the “claimed combination does not recite the particulars of the sub-combination,” fails on its face since the claimed combination does, in fact, clearly recite the same particulars of the sub-combination.

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Both include the same elements: transistors, a bias current device, current mirrors, and current sources, and each performs substantially the same function. The only difference between the elements of the transconductance amplifier of claim 1 and the transconductance amplifier is that claim 1 employs the language "a plurality of" whereas claim 10 employs "N", where N is with reference to the number of phases of the regulator. And since the regulator is a multiphase regulator, N is greater than 1 and thus, by definition, the N elements recite a plurality of elements. Applicant respectfully submits, therefore, contrary to the Examiner's reasoning, that the combination in claim 10 in fact recites substantially the very same particulars of the sub-combination of claim 1.

Furthermore, part (A) of the required test for restriction provided in MPEP 806.05(c) also fails in that the combination as claimed (i.e., claim 10) does, in fact, require the particulars of the sub-combination as claimed (i.e., claim 1) for patentability. Other than the transconductance amplifier and its particulars, claim 10 recites an N-phase regulator including N output circuits, N output current sensing circuits, and a power circuit. In this case, the power circuit has N inputs each coupled to a corresponding one of the N correction nodes and N outputs each providing a PWM signal with corrected duty cycle to a corresponding one of the N output circuits. Applicant respectfully submits that there are a very significant number of prior art regulators including each of these features, so that such combination, absent the particulars of the transconductance amplifier, is not separately patentable.

In particular, many prior art multiphase regulators include corresponding output circuits (e.g., switching transistors, inductive devices, output capacitors, etc.), output

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current sensing devices (not all multiphase regulators sense output current but most do), and a power circuit, where the power circuit as claimed does nothing more than correct the duty cycle of the corresponding PWM signals based on corresponding correction nodes. The claimed structure of the combination is not specific as to how these other functions are performed, so that Applicant relies on the particulars of the transconductance amplifier for patentability, in which these same particulars are recited in claim 1.

In this manner, the combination recited claims 10-13 does recite the particulars of the sub-combination of claim 1 and such particulars are required for patentability.

Claims 14-18 are directed towards a method of balancing current in an N-phase regulator, including *sensing output current* for each of the N phases and providing corresponding N feedback sense voltages, *biasing* N transistors with a total bias current of I_B , applying each of the N feedback sense voltages to a control input of a corresponding one of the N transistors to develop N sense currents, *mirroring* each of the N sense currents into a corresponding one of N correction nodes, *sourcing a current* of I_B/N relative to each of the N correction nodes to provide N correction currents, and *adjusting current* of each of the N phases based on a corresponding one of the N correction currents.

In claim 1, each transistor *senses* output current, the bias current device *biases* the transistors, the current mirrors each *mirror* current, and the current sources each *source* current to correction nodes, thereby adjusting currents at the outputs.

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It is unclear how the method of claims 14-18 are somehow directed towards a combination of which the transconductance amplifier of claims 1-9 are a sub-combination, since the elements are substantially similar other than the fact that one set is a claimed apparatus and the other is a claimed method. Other than the preamble of claims 14-18, which refer to balancing current in an N-phase regulator, the functions or "steps" of claim 14 follows the elements of claim 1 very closely, and effectively recite the same combination, or for that matter, the sub-combination. Applicant respectfully submits, therefore, that the particulars of the "sub-combination" of claim 1 are recited in claim 14 in the form of a method, and that these particulars, by definition, are required for patentability.

Applicant respectfully submits, therefore, that the particulars of the subcombination of claims 1-9 are recited in the combination of claims 10-18, and that such particulars are required for patentability. Applicant requests reconsideration and withdrawal of the restriction requirement. Applicant nonetheless provisionally elects claims 1-9 of the invention group II.

PATENTCONCLUSION

Applicant respectfully submits that for the reasons recited above and for various other reasons, the restriction requirement is improper and should be withdrawn. Reconsideration of the restriction requirement is respectfully requested. Should this response be considered inadequate or non-responsive for any reason, or should the Examiner have any questions, comments or suggestions that would expedite the prosecution of the present case to allowance, Applicants' undersigned representative earnestly requests a telephone conference.

Respectfully submitted,

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By:

Gary R. Stanford
Gary R. Stanford
Reg. No. 35,689

Gary R. Stanford
Law Office of Gary R Stanford
Customer Number 26122